What is claimed is:

1. An optical system comprising:

a tunable laser providing a swept optical output;

a tracking stage optically coupled to the tunable laser having an optical filter providing a periodic optical signal in response to the swept optical output to a detector providing a periodic electrical signal, wherein the optical filter has a free spectral range of not less than a greatest expected mode hop of the tunable laser.

2. The optical system of claim 1 wherein the tracking stage provides a second periodic optical signal in quadrature with the periodic optical signal, and the optical system further comprising:

a second detector coupled to the second periodic optical signal and providing a second periodic electrical signal;

a phase detector coupled to the detector and to the second detector and providing a phase detector signal;

a frequency multiplier coupled to the phase detector signal providing a multiplied phase detector signal; and

a digital signal processor coupled to the multiplied phase detector signal providing enhanced resolution of the swept optical output.

3. The optical system of claim 1 further comprising a digital signal processor coupled to the periodic electric signal to track the swept optical output over mode hops.

4. The optical system of claim 1 further comprising a second tracking stage optically coupled to the tunable laser and having a second optical filter providing a second periodic optical signal in response to the swept optical output to a second detector, wherein the second optical filter has a second free spectral range less than the first free spectral range.

5. The optical system of claim 4 wherein the second free spectral range is selected according to a desired wavelength resolution of the optical system.

6. An optical system comprising:

a tunable laser providing a swept optical output having a discontinuity in output wavelength from a first wavelength at an end of a first continuous tuning range to a second wavelength at a beginning of a second continuous tuning range;

a first tracking stage optically coupled to the tunable laser and having a first optical filter providing a first periodic optical signal in response to the swept optical output to a first detector; and

a second tracking stage optically coupled to the tunable laser and having a second optical filter providing a second periodic optical signal in response to the swept optical output to a second detector, wherein the first optical filter has a first free spectral range not less than a difference between the first wavelength and the second wavelength providing tracking of the swept optical output over the discontinuity in output wavelength and the second optical filter has a second free spectral range selected to provide a desired wavelength resolution of the optical system.

7. The optical system of claim 6 wherein the first free spectral range is sufficiently large to track the swept optical output across a maximum expected mode hop of the tunable laser.

8. The optical system of claim 7 wherein the first free spectral range is at least twice the maximum expected mode hop.

9. The optical system of claim 6 wherein the first tracking stage further provides a third periodic optical signal in quadrature with the first periodic optical signal.

10. The optical system of claim 9 wherein the first free spectral range is less than twice the difference between the first wavelength and the second wavelength.

11. The optical system of claim 9 wherein the second tracking stage further provides a fourth periodic optical signal in quadrature with the second periodic optical signal.

12. The optical system of claim 11 wherein the second free spectral range is between 1 pm and 10 pm to achieve a wavelength resolution of the optical system less than 0.1 pm.

13. The optical system of claim 6 wherein at least one of the first optical filter and the second optical filter comprises a Fabry-Perot optical filter.

14. The optical system of claim 6 wherein at least one of the first optical filter and the second optical filter comprises a 3-port fiber interferometer.

15. The optical system of claim 14 wherein the fiber interferometer is a multiple-beam interferometer.

16. The optical system of claim 6 wherein at least one of the first optical filter and the second optical filter comprises an optical couplet.

17. The optical system of claim 6 further comprising:

a digital signal processor coupled to the first detector and to the second detector to determine a direction of a mode hop;

a reference cell optically coupled to the tunable laser; and

a reference detector optically coupled to the reference cell providing an electrical reference signal to the digital signal processor to determine an absolute wavelength of the swept optical output tunable laser.

18. The optical system of claim 17 further comprising a third detector wherein the swept optical output is configurable to be coupled to a device under test disposed between the tunable laser and the third detector, the third detector being coupled to the digital signal processor to determine a wavelength response of the device under test.

19. The optical system of claim 17 further comprising:

an optical mixer optically coupled to the tunable laser and to receive an optical signal from a device under test to produce an intermediate optical signal;

an intermediate detector coupled to the intermediate optical signal providing an intermediate electrical signal to the digital signal processor.

20. An optical system comprising:

a tunable laser providing a swept optical output;

a first tracking stage optically coupled to the tunable laser and having a first optical filter with a first free spectral range providing a first periodic optical signal in response to the swept optical output to a first detector and a first quadrature signal to a first quadrature detector; and

a second tracking stage optically coupled to the tunable laser and having a second optical filter with a second free spectral range providing a second periodic optical signal in response to the swept optical output to a second detector and a second quadrature signal to a second quadrature detector, wherein the first free spectral range is selected to provide tracking of the swept optical output over a greatest expected mode hop of the tunable laser and the second free spectral range is selected to provide a desired wavelength resolution of the optical system.